

# (12) UK Patent Application (19) GB (11) 2 287 152 (13) A

(43) Date of A Publication 06.09.1995

(21) Application No 9423503.3

(22) Date of Filing 21.11.1994

(30) Priority Data

(31) 9404018

(32) 02.03.1994

(33) GB

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(51) INT CL<sup>6</sup>

H04N 7/18, G08B 15/00

(52) UK CL (Edition N )

H4F FAAE FD12X FD18R FD22 FD27L FD83B

U1S S2188

(56) Documents Cited

US 5144661 A US 5027104 A US 4949186 A

(58) Field of Search

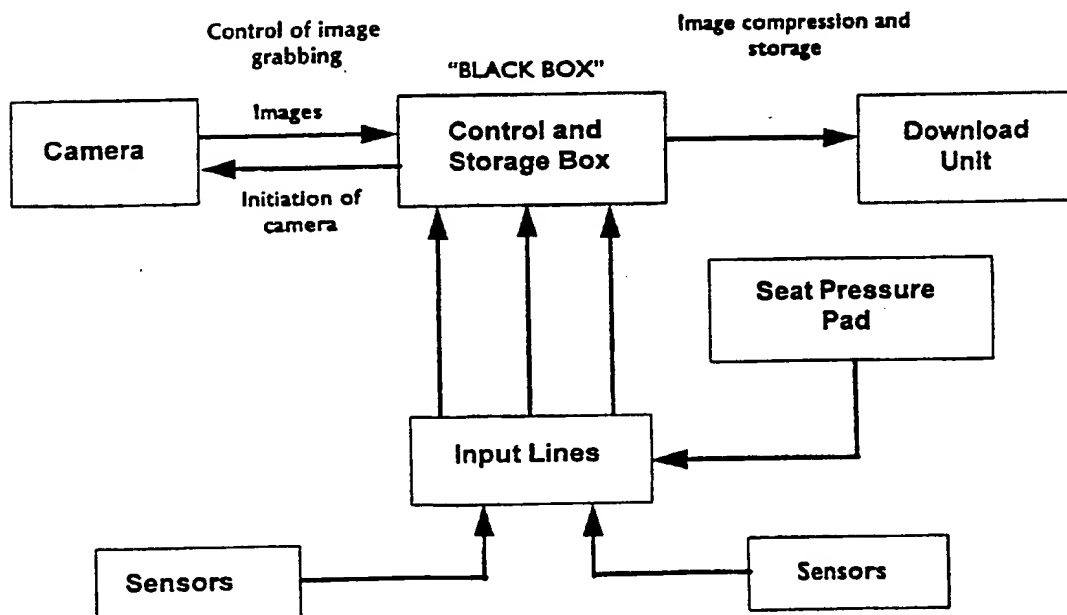
UK CL (Edition N ) H4F FAAE FAAX

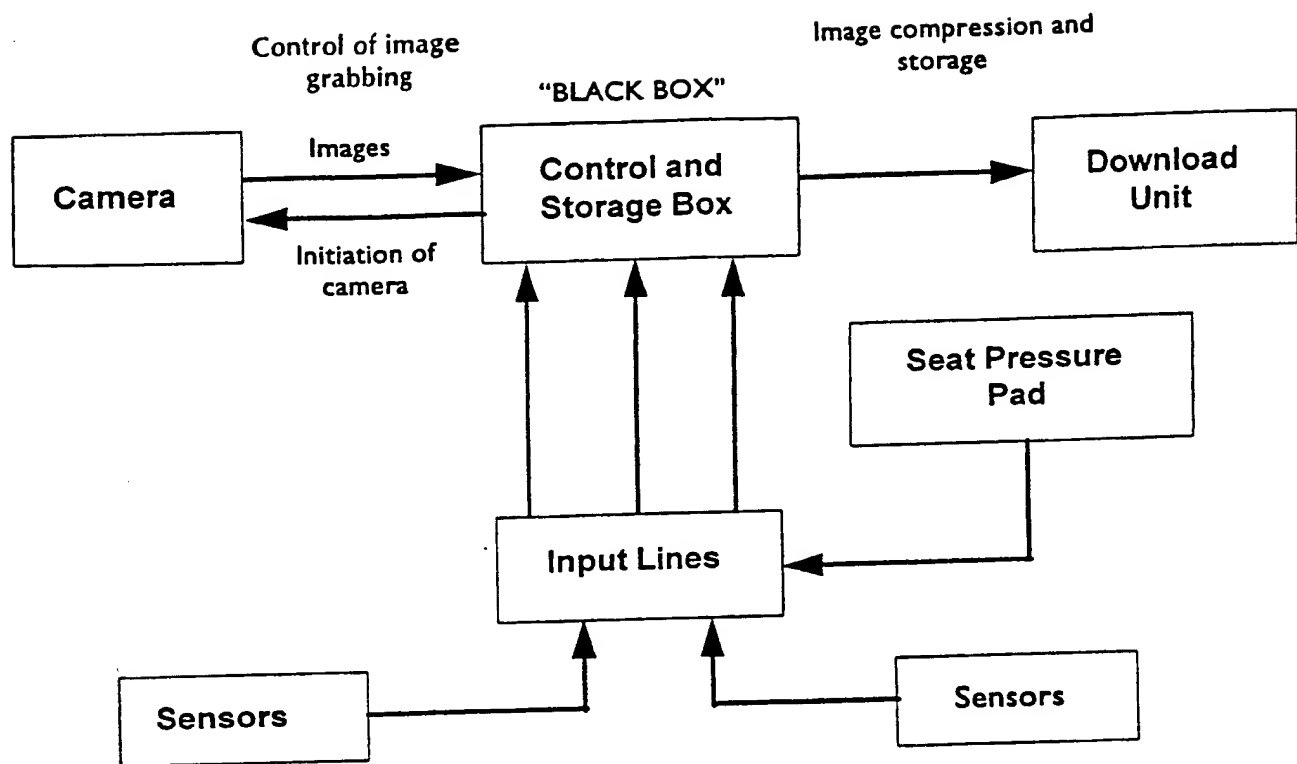
INT CL<sup>6</sup> G08B 13/196 15/00, H04N 7/18

Online databases: WPI

(54) Vehicle security system

(57) A vehicle is equipped with a system including a hidden camera for capturing an image of the driver and/or passenger via a lens mounted in an interior surface of the vehicle, and means for recording the image at a remote location or in a vehicle mounted black box.





VEHICLE SECURITY SYSTEM

This invention relates to a security system for vehicles. It is intended to provide a counter to the growing problem of vehicle theft.

5 One means of preventing unauthorised access to a vehicle is by a locking system. Such systems are of limited effect, or lead to an undesirable degree of damage being caused by a potential or actual thief.

10 A locking system may be associated with an alarm. Again, there is a limited deterrent effect, and also a considerable nuisance effect, often caused by accidental actuation.

15 Security cameras, connected to video recorders, are widely used to record images of those making unauthorised access to property. Such systems are usually adapted to continuous monitoring. They may use conspicuous cameras, in large spaces, which are movable to give a wide range of view, and which are positioned at high points, to prevent destruction.

20 According to the present invention, a vehicle is equipped with a hidden camera and remote recorder. For example, a vehicle includes means for monitoring the driving position and taking images periodically, and means for recording the images at a remote location in the vehicle.

25 An object behind the present invention is not to prevent a thief's access to a vehicle, but to record the presence of the thief. The monitoring means is preferably sufficiently small that it is not obvious. However, even if it is observed by the thief, and destroyed, the period between the taking of images can be sufficiently short that an image is recorded, at a location that cannot be readily determined by the thief and which is therefore highly resistant to destruction.

30  
35 Even if the vehicle is involved in an accident, the recording means can be located in a less vulnerable position and/or surrounded by strong material, so that, in

effect, a "black box recorder" can be recovered from the wreckage. Nevertheless, one possible advantage of the present invention is not necessarily to record an image of a thief after the vehicle has been stolen and wrecked, but to deter a potential thief by indicating that the vehicle is provided with what is, in effect, a video-recorder.

An important aspect of the present invention is that its components may be small. The technology exists for the provision of the monitor, not as a conventional video camera but as a small tubular member with a small lens, connected by, for example, a fibre optics cable to a "black box" in which recorded images are stored on a chip. The images can then be reproduced visually, as required.

If desired, the system of the invention may be associated with a switch such that no images are taken/recorded when the vehicle is driven by a permitted driver. Alternatively or in addition, the system may comprise an activating means adapted to operate only when forced entry is sensed. Thus, a security system according to this invention is quite distinct from an alarm system.

More particularly, a system of the invention includes a device that uses digital image processing techniques to capture an image of the vehicle thief, and store it in the computer chip memory, as opposed to on tape in magnetic form. This digital information can be down-loaded into a standard video printer, when required, and a photograph or still of the "video" can be viewed on a computer screen, or printed out. The image is captured by means of a well-hidden video camera, with a lens to enable a large area of the car driver and/or passenger space to be "filmed". This device can be mounted in the dashboard or other internal areas of a motor vehicle.

The presence or existence of this device acts as a general deterrent, to a thief who will not know whether he is being photographed, because there is no ready evidence that a camera system is installed. Once obtained, the

images can be used to identify the offender and can be used in court as evidence against that person.

5 The invention will now be described in more detail, by way of illustration only. A suitable camera system is based on a normal CCD camera. It drains minimal current from a car battery when not operational.

10 The vehicle camera system is triggered into action by a separate sensor or possibly by the system by using intelligent image processing techniques. It then captures images from the area under surveillance. The system can be triggered by one or a number of inputs, and/or in accordance with a pre-set time pattern, to "grab" a frame from the video camera. For example, such a system may have an input from the seat-belt warning light pressure pad, so  
15 that an image can be grabbed when pressure is applied to one or both of the front seats. An alternative example comprises an input from activation of the rear brake lights (indicating the brake pedal has been pressed and an occupant is present in the field of view of the camera).  
20 Other available "sensors" may include a glass break sensor or other mountable vehicle accessory, so that an image can be grabbed and stored in memory when a window in the field of view is broken.

25 The control and storage box is small, e.g. 8 cm x 11 cm x 2 cm or smaller. It may be of low cost, and use solid state permanent memory (flash RAM) for storage of the images.

30 Should these devices become widespread, it is likely that thieves will obtain the knowledge of what to look for; even a pin hole aperture for the camera would be too large to effectively conceal it. Thieves may therefore try to destroy the camera, and thereby prevent their picture being taken.

35 To circumvent this problem the video signal is sent down a cable from the camera to a concealed "black box" which can be hidden at any point inside the car. Therefore, when the vehicle is recovered, evidence of the

theft is still retained inside the hidden black box, and it can be retrieved from the memory system.

Due to the common process of "torching" vehicles once they have been stolen, the housing for the electronics should be as rugged as possible, along the lines of flight recorders used on aircrafts. The "black box" should be able to withstand a direct impact from a heavy object such as a hammer, without the picture storage being affected. For example, the storage chip may be protected by a metal casing. The system will preferably also withstand a car fire, which can reach as high as 1300K and last up to half an hour.

The user of the vehicle downloads pictures for display to a personal data carriage (PDC) which conveniently enables a user to collect the images from the control box without "reinstalling" the whole device. Such a PDC is designed to connect to the, say, RS232 port of a computer and by means of suitable software can display the pictures to determine if hard copies need to be produced. The PDC does not need any internal power to hold the images, which it can retain for over 10 years. The PDC can be connected to a video printer and hard copies of the image with, say, time and date-stamp, can be produced for presentation.

The system can be integrated with the alarm, immobiliser and central locking of a vehicle. It may include optional triggers to cover the risk of theft of specific contents in the vehicle such as radio etc.

Pictures can be taken in all lighting conditions in a vehicle, by using an infrared flash system that invisibly illuminates the subject when a picture is being taken. Suitable infrared sources may be provided so that they appear as disused LED bars. They can be easily disguised either on the dashboard of the vehicle or against the A pillars.

35 In an alternative embodiment of the invention, the image, rather than being recorded in a black box concealed within the vehicle, is transmitted using the cellular

CLAIMS

1. A vehicle equipped with a system including a hidden camera for capturing an image of the driver and/or passenger via a lens mounted in an interior surface of the vehicle, and means for recording the image at a remote location.
2. A vehicle according to claim 1, wherein the system is adapted to operate only on unauthorised entry to the vehicle.
3. A vehicle according to claim 1 or claim 2, wherein the recording means is located in the vehicle, enclosed in a strong, tamper-proof, heat-resistant housing.

Patents Act 1977  
Examiner's report to the Comptroller under Section 17  
(The Search report) 8

Application number  
GB 9423503.3

Relevant Technical Fields

- (i) UK Cl (Ed.N) H4F - FAAE, FAAX  
(ii) Int Cl (Ed.6) G08B - 13/196, 15/00 H04N - 7/18

Search Examiner  
D H JONES

Date of completion of Search  
11 JANUARY 1995

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
1 TO 3

(ii) ONLINE DATABASES: WPI

Categories of documents

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.  
Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.  
A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

| Category | Identity of document and relevant passages |   | Relevant to claim(s) |
|----------|--|---|----------------------|
| X, Y     | US 5144661                                 | (SHAMOSH) see Figure 3 and line 13 column 5 to line 60 column 6 . | X: 1, 2<br>Y: 3      |
| X, Y     | US 5027104                                 | (REID) see whole document   | X: 1, 2<br>Y: 3      |
| Y        | US 4949186                                 | (PETERSON) see lines 56 to 61 column 1                            | 3                    |

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).



network and a modem to a centralised control centre. In this instance, the risk that a thief may identify the black box and attempt to destroy the evidence is eliminated because the image is transported to a third party location when the break-in occurs. ↗

5 Instead of having a black box installed in the vehicle, the camera will be linked to a modem and a non-land-line telephone system. It is not necessary that this portable telephone system should be accessible within the vehicle, because it will not be used for traditional  
10 telephone calls. This telephone system will then transmit through a modem to transfer the images along the telephone network to a central control centre. This central control centre will quote a receiving telephone and modem and  
15 appropriate VDU printing equipment.

It will also be possible to identify at the central location that a vehicle is being broken into, where the vehicle is, where it is, and when. This will give the opinion of informing the owner of the vehicle that theft is  
20 taking place, very much in the same way as current tracking technology. Information such as the registration number and VIN number may be recorded at the same time.

The invention will now be described by way of example only with reference to the accompanying flow diagram which  
25 is a schematic representation of the pieces of hardware incorporated into a system, and their interaction.

A camera which is mounted into the dashboard is connected by conventional wiring or by the use of fibre optics to a separately located recording device contained  
30 within the "black box". This "black box" contains a storage chip for saving images taken by the camera. In turn, the "black box" is connected to the download unit. This unit can be located anywhere within the car. It can be located to provide easy access for the car owner, as it  
35 is not necessary that its location remains a secret.

A PDC may also be provided, and which contains a chip for storage of images. Images recorded by the "black box"

within the car can be downloaded to this brick, so that they can then be transported without breaking the legal chain of evidence.

- 5 A further piece of hardware is the translating unit which enables the information in the PDC to be translated into a form that allows a video printer to produce a printout. Such a printout can be of photographic quality.